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Learning to Grow: How school gardens can provide food for education

Thoric Cederstrom, Counterpart International

Through the Looking Glass

"School gardens do not work!" an esteemed colleague of mine once remarked. Her expertise in school health and nutrition stopped me, a dedicated agronomist, in my tracks. "How's that?" I queried. "Well, most times women do most of the work, yet derive few of the benefits, and the amount of food produced does little for the nutrition of children attending school." I thought about the dozens of school gardens I had seen throughout my career that spanned as many countries in as many years. Some had been quite scanty that was true, but others were spectacular, teeming with verdant plants laden with ripe vegetables. Could it be that gardens, developed and maintained by students and teachers, really do not work? It hardly seemed possible. I remembered another conversation with another colleague, an expert in experiential education. "Gardens offer students a hands-on opportunity to learn many things," she quipped enthusiastically. "Math, chemistry, biology, and many other subjects 'grow' in the garden," she continued, "it is well-documented that children learn better by doing." These discussions prompted the formulation of a basic question: "Do school gardens work?" Such a question, though, is too easy. The real question to be answered is: "Under what conditions do school gardens work?"

Down the Rabbit Hole

It seems that growing a few vegetables in a schoolyard would be a simple affair. You drop a few seeds, sprinkle some water, pull the weeds, harvest the bountiful produce for tasty school snacks for hungry children who then take the gardening skills home to mama and papa. However, simple things are often the most difficult. This article intends to review simple guidelines for a successful school garden and to discuss potential contributions to community and household food security. It is my contention that school gardens, properly designed and managed, offer great potential for both nutrition and educational purposes in an overall food security program.

The first step, however, before embarking on any journey is to have a pretty good idea of where you are going. The same is true for school gardens. What works in terms of school gardens depends on what you want them to do. A food security project that contemplates including school gardens as a possible intervention must first clarify what it wishes to accomplish. Will gardens primarily function to supplement the school-feeding component of a Food for Education program with produce full of micronutrients? Or, will the gardens be an integral part of an experiential education curriculum that involves parents as co-teachers? Or, will gardens be a source of income for motivated but underpaid teachers struggling to survive? Or, will a school garden project seek to have multiple outcomes—nutritional, educational, and economical? Whatever the objectives be, project designers must be clear about what they hope to accomplish. The following paragraphs offer directions on a roadmap of school garden design.

Adventures in Wonderland

The golden rule in all project design is to first consult the potential participants. What do the students and teachers say? Sometimes, the distance is great between what local people may want, what program people think is best to alleviate food insecurity, and what is feasible under existing conditions. Deciphering these different transects is the first step in determining whether a school garden will "work" or not. If participants are unenthusiastic or uncertain about a school garden project because their priorities lie elsewhere, i.e. rehabilitating the school's infrastructure, installing a well, or getting new didactic materials, then the project may do well not to promote gardens. However, if the uncertainty stems from a lack of knowledge or experience, then the project could choose to introduce gardens in a gradual manner, expanding them as positive results accrue and people gain confidence. On the other hand, if people clamor for school gardens as the centerpiece of their educational endeavor, then the project might want to consider how gardens can play a more important role. In the former **Soviet Union**, for example, school gardens were a critical part of the educational curriculum and therefore significant resources, including farm equipment, greenhouses, and personnel, were dedicated to their success. Even under the drastically

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changed circumstances of the post-Soviet era of weakened central states with anemic budgets for education, many communities in that region still demand school gardens.

After you've determined the acceptability of school gardens to the target population, then it's time to determine their feasibility. Several aspects need to be considered:

School gardens, properly designed and managed, offer great potential for both nutrition and educational purposes in an overall food security program.

Physical Requirements: The same considerations for other agricultural interventions will hold true for school gardens: Are the soils good? Is there adequate solar radiation? Is water available for irrigation? Physical conditions can very greatly within a program area and schools are usually situated without regard to the agricultural potential of the land they sit on. That said, much could be done to improve soil quality through composting, mulching, raised beds, and use of containers. So, while good soil makes gardening easier, its lack will not stop a determined gardener. Sunshine is a harder constraint to overcome, as most vegetables don't grow well in the shade. But again creativity is the best response: rooftop agriculture has been successfully promoted by the FAO in numerous urban settings. In some cases however, limited sunlight may restrict gardening activities. Another important matter is water especially in drier regions where irrigation will be crucial. If water is scarce, and the garden will compete with other needs such as drinking, washing or household food production, the project may want to focus on other activities. However, there may be solutions, such as water catchment systems or gray water, to provide sufficient moisture to the plants. In **Honduras**, I have seen bountiful school gardens watered from barrels that have collected rain from rooftops and leftover water from the kitchen or hand washing.

Knowledge and Management Requirements: For any kind of agriculture to be successful, technical input is essential. In the case of school gardens, this may mean assistance from a trained technician that visits the school regularly to provide training and to help solve problems (e.g. pests) should they arise. Or another option may be to draw upon the knowledge base within the community. For example, a method successfully utilized in northern **Mexico** for a school garden project in peri-urban neighborhoods is to survey and inventory local "successful" gardeners. These local "experts" are sought out as trainers and educators for the school gardens. They have not only developed gardening techniques appropriate for the physical environment, but know the local language to communicate effectively.

School gardens will also require the active participation of the teachers, students and quite possibly parents. Questions to be considered regarding their level of involvement will center around their availability of time to dedicate to the activity, opportunity costs of becoming involved, and whether they could be more productively involved in other food security activities that would contribute more to their family's food security. In communities where food insecurity is severe, school gardens—if they compete unduly for limited time—may not be a good programming choice. However, again, careful analysis is required because low-labor, high-output gardens can be designed.

Good management is essential for successful garden production as vegetable crops are extremely sensitive to water deprivation and vulnerable to a host of pests. Therefore, they require careful oversight and someone needs to assume responsibility for preparing the soil, planting, pulling weeds, managing pests, watering, and harvesting the produce. Students, under appropriate supervision, can do most of these tasks themselves. Once basic training is provided, garden management is not difficult. Again, there are many different options a project can pursue. In some cases, the teachers may chose to take on the garden, in others the students themselves especially if they are older will do the work, and in other situations, the parents may be the guardians of the garden. In **Bangladesh**, a school gardens project decided to appoint one village resident to manage the garden, this person being compensated with a percentage of the proceeds. Regardless of the modality chosen, food security projects must give careful consideration of how gardens will be managed, otherwise plants will wither and die or produce and proceeds will be diverted.

Finally and most importantly, someone must decide what crops will grow well under the physical conditions of the project area. A crop calendar will be vital and may reveal that the school year does not coincide with the traditional growing season. In many countries, the school year is set so children are home during the agricultural cycle in order to help out on the family farm. However, creative solutions are possible by using effective and low-cost technologies to greatly extend the growing season. For example, simple greenhouses, built with clear plastic sheeting, can provide an excellent physical environment for growing vegetables. This is precisely what a school garden project in **Tajikistan** and another in **Bolivia** have done. Using mainly local materials and building on existing farming technologies, these projects have constructed adobe-walled structures covered with plastic. The resulting conditions allow students to grow a variety of fresh vegetables for a longer period of time each year.

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Standardized Monitoring and Assessment of Relief and Transitions (SMART) Workshop Summary

Submitted by the FANTA Project

Standardized Monitoring and Assessment of Relief and Transitions (SMART) is a U.S. inter-agency global initiative to improve the reporting, monitoring and evaluation of humanitarian assistance interventions. This initiative aims to provide implementing partners and the broader humanitarian community with a range of tools to support humanitarian program assessment.

In July 2002, the Food and Nutrition Technical Assistance Project (FANTA), with funding from USAID, organized and conducted a workshop on Standardized Monitoring and Assessment of Relief and Transition -- the SMART Technical Working Sessions. For the first time, U.S., Canadian, and European private voluntary organizations (PVOs) and non-governmental organizations (NGOs), international organizations, academia and donors met to review and resolve problems of using assessment tools and methodologies in emergency situations. Participants included representatives from 45 institutions, including twenty non-governmental organizations (NGOs), seven UN agencies and other donors, universities, and government institutions.

The working session was sponsored by the American Red Cross (ARC), Canadian International Development Agency (CIDA), United States Agency for International Development (USAID), United States Department of State, Bureau of Population, Refugees and Migration (State/PRM).

The technical sessions were supported and coordinated by the Food and Nutrition Technical Assistance (FANTA) Project/Academy for Educational Development (AED) with assistance from Food Aid Management (FAM).

The SMART Initiative

The goal of the SMART initiative is to pilot an approach to routinely collect, analyze and disseminate nutrition and mortality of populations in crisis, emphasizing the importance of interpreting data in context to facilitate more effective decision-making. The SMART initiative plans to develop information management tools for field reporting, a web-based forum for posting survey reports, and a list-serve for field staff to have direct, immediate access to a pool of experts drawn from various organizations.

SMART Technical Working Session

The objective of the three-day technical working session was to establish a generic, standardized methodology for assessing mortality rate and nutritional status of populations in crisis which would be accepted and adopted by all organizations working in humanitarian assistance. A one-day Policy Session immediately followed the working session and to convey the key conclusions of the working session to policy makers and to promote a better understanding of how policy and program decisions are made by donors and international agencies.

Summary of Key Areas of Consensus

- Timely, reliable, and standardized data is essential for making policy and program decisions to address the needs of populations in crisis.
- It is important to establish a generic, standardized methodology to be used in all emergencies for assessing nutritional status.
- Crude Mortality Rate (CMR) and nutritional status of children under five are considered the most basic, essential indicators for assessing the overall severity of population stress and for monitoring the overall effort of the humanitarian community. The standard nutritional status indices to be used are wasting (thinness or marasmus) and edema (kwashiokor). Wasting is measured using weight-for-height.
- Analysis of trends is recommended for determining whether a situation warrants intervention. Frequent surveys using a simple methodology, are recommended to recalibrate surveillance data and monitor trends.
- Mortality survey data should to be compared with other data such as nutritional status, surveillance (e.g. incidence and program coverage), grave counting, religious authority records, mother to child ratio, and demographic profile.
- Data on wasting and edema should be reported separately.
- Nutritional survey data cannot be interpreted in isolation. A wide variety of information sources should be drawn on. In particular, food security needs to be understood to interpret nutritional survey data.

Next Steps

The SMART initiative will develop guidelines and other tools to assist organizations in using the proposed standardized methodology. In addition, an independent technical advisory group will be formed to review and accredit surveys for policy and program decision-making. Operational research and validated studies will be conducted to guide future recommendations and modifications on the current standardized methodology with on-going technical assistance to the humanitarian assistance community.

Workshop proceedings will be available from FANTA's website (www.fantaproject.org) later this year.

Agricultural Extension Services in Kenya: CARE's "TRACE" Extension Methodology

by Njoroge Maina, CARE Kenya

This article describes the unique extension methodology developed by CARE Kenya through nearly 20 years of agricultural programming, and lessons learned during its use. CARE-Kenya has been involved in agriculture extension over three program phases:

1. First, an Agro-forestry Extension Project (AEP), a component of CARE's Rural Integrated Development (RID) project which ran in two phases between 1984 and 1991.
2. Second, the Agro-Forestry Extension (AE) Project, an element of a Skills and Resources for Community Productivity (SRCP) Project which ran between 1992 and 1998.
3. Finally, Improved Agriculture for Smallholders in Western Kenya (TASK) Project, which is an element in the Nyanza Household Livelihood Security Programme (commonly referred to in the local dialect as Dak Achana Programme),which runs from 1999 to 2003.

The three phases depict CARE-Kenya's approach to extension in the Agriculture and Natural Resource (ANR) sector over the last two decades.

- The focus of major activities of the first phase concentrated on tree planting and the transfer of tree farming technologies, with emphasis on fuel-wood production. The extension approach adopted emphasized direct material support for special target groups and institutions, such as women's groups, primary schools, youth polytechnics, and church groups. Materials such as tree seedlings, tree seeds, wheelbarrows, watering cans, hoes, donkeys and donkey carts were provided to participants to enhance their tree-planting efforts.
- The second phase of CARE-Kenya's involvement in the ANR sector witnessed a shift from emphasizing pure tree farming and input supply to an approach that incorporated the wider aspects of agro-forestry, such as crop and animal production. The goal was improving the welfare of the farming community through enhancing land and labor productivity, income generation, and environmental quality. To achieve these goals, the project formulated and tested a new extension approach aptly named TRACE: Training Resource Persons in Agro-forestry for Community Extension. TRACE is a participatory extension process in which the community is trained through their selected resource people.

The TRACE process

TRACE aims to increase the community's development potential through a process that has three inter-linked components:

Institutional capacity development

This component develops a positive attitude towards agriculture as an economic occupation; the ultimate aim is to maximize mobilization and utilization of available resources for increased production. This is achieved through formation and training of local institutions in such areas as community leadership and management. Locational Management Committees (LMCs) are formed in each selected location to assess, plan, and oversee implementation of project intervention. A Certificate of Partnership is signed between LMCs (on behalf of the community) and CARE detailing each party's role in the implementation process.

Adaptive research

This component adapts and validates Agroforestry technologies to farmers' conditions to increase adoption and productivity. The LMCs facilitate selection of research farmers who, after thorough training on the concept and practice of adaptive research, conduct research on behalf of the community .Unlike research conducted in far-away, stations the community members participate in the management, monitoring and analysis of the trials. Data analysis is done seasonallyand extension messages are developed. The process brings together various research and developmentagencies and the community, closing the research-extension gap.

Extension and Training

This is the main thrust of the TRACE process. It is designed to scale–up adoption of validated technologies.Through this componentmessages developed from adaptive research trials are passed on to the rest of the community. Selected Community Resource Persons are first trained by project staff, afterwhich they train the restof the community in a farmer-to-farmer process. The hands-on training sessions are conducted in the resource persons' farms, reducing the costoftechnology access to poor, rural farmers.

Progress in the Current Program Phase: TASK

The third and ongoing phase is The Improved Agriculture for Smallholders in Western Kenya (TASK) Project. The design of the five-year project is based on the evaluation of the Agroforestry Extension Project (1992-1998), which found the TRACE process is very successful in helping resource-poor farmers recognize and maximize their inherent potential to improve their livelihoods.

> **TASK Goal:** sustainable increase in food availability through enhanced farmer knowledge and practice of improved agriculture technologies
> **TASK Target Population:** subsistence farmers in the low potential agroecological zones around the Kenyan side of Lake Victoria .

For various reasons, including the harsh conditions and culture, the community does not value agriculture as an economic occupation, as indicated by very low investment in the sector. This leads to very low crop production,much of which is sold off for lack of an alternative source of income for procurement of non-food items. There are 3-4 hungry months per year during which various coping mechanisms are employed.

Using the TRACE methodology, the capacity of community institutions is addressed through training in leadership and management, new technologies tested through participatory research, and information provided through extension and training. Transportation support is provided to the community to enable technology adopters to access new planting material.

The project has been implemented for four years, during which the community has made commendable improvement in agriculture as indicated by increased investment in the sector, increased yields, adoption of new high-value crops such as fruit trees, bananas and pineapples, and increased agricultural income a community which did not believe in agriculture as an economic activity has changed its attitude and is on the way to food self-sufficiency.

A community which did not believe in agriculture as an economic activity has changed its attitude and is on the way to food self-sufficiency.

Lessons Learned

A reliable extension methodology is key to a successful agriculture project, and the value of TRACE is evident. Using TRACE during this short period, For many in the community farming is no longer the "other" business but the main business.

For example, at the beginning of the TASK project in 1999, we sought to introduce bananas and pineapple production for income generation, and to reduce the diversion of food crops for sale which hindered household consumption. It was agreed that the community should contribute the cost of the "suckers" (similar to seedlings in layman's terms) while the project contributed transport. It is not normal for communities to "give" money to NGOs, let alone international NGOs like CARE. In the beginning, the price of a sucker was 5 Kenyan Shillings for bananas and 3 for pineapples, yet it took weeks to collect enough contribution for a pick-up load. Today, over one year since the project stopped delivering the banana and pineapple suckers, the community is buying from the early adopters at 20 Kenyan Shillings for bananas and 5 for pineapples, without free transport
The motto of the project is *Building confidence through food security*. There is no doubt TRACE methodology is a good companion for today's extension worker.

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FAM Bids Farewell to Deputy Coordinator Steve Zodrow

This quarter we send our best wishes with former FAM Deputy Coordinator Steve Zodrow, as he departs FAM to begin an exciting new chapter in his career with the U.S. Peace Corps in Azerbaijan. During the nearly three years Steve worked with us, he made a tremendous contribution to FAM's working groups on environment, local capacity building, and monitoring and evaluation. Steve's involvement with workshops produced by these groups, as well as other FAM projects too numerous to list here, helped to ensure their successful completion. We want to thank and commend Steve for his work at FAM, and wish him and his family a safe and happy journey to their new home.

FSRC Resources on Biotechnology and Development

Compiled by Gillian Akiwumi, FSRC Summer 2002 Intern and

Katherine Bahk, FSRC Fall 2002 Intern

Appropriate Biotechnology in Small-scale Agriculture: How to reorient research and development. Bunders J.F.G., Broerse J.E.W. 1991. 153p. **FSRC #1906** .

This book is aboutsmall-scale farmers and the possibilities ofbiotechnology to improve theirliving conditions.

Biotechnology for developing-country agriculture – Problems and opportunities. Persley G. J. 1999. [20]p. **FSRC #7772** .

This is a publication of the International Food Policy Research Institute that addresses: biotechnology and food and nutrition needs, biotechnology and animal vaccines, the role of the private sector, disentangling risk issues, safe use of biotechnology, intellectual property protection, research policy and management issues, and developing appropriate policies.

The use of proprietary biotechnology research inputs at selected Latin American NAROS (National Agricultural Research Organizations). International Service for National Agricultural Research (ISNAR), Cohen, Joel I. et al.2000, no. 44. 8p. **FSRC #7920** .

Available online at: http://www.isnar.cgiar.org/publications/briefing/Bp44.htm

The main purpose of this Briefing Paper is to provide an assessment of the use of proprietary biotechnology inputs in the agricultural research systems of selected Latin American countries. A survey was conducted among 13 national agricultural research organizations (NAROS) on the application ofproprietary research inputs and prospects for generating innovative products from these.

IFIC Food Biotechnology Resources. International Food Information Council (IFIC) Foundation. 1998. **FSRC #8050**.

The International Food Information Council (IFIC) is a non-profit organization whose mission is to communicate science-based information on food safety and nutrition to health and nutrition professionals, educators, government officials, journalists and others providing information to consumers.

Biotechnology and Development Monitor. The Network University. FSRC #8156.

Available online at http://www.biotech-monitor.nl/index.html

The *Biotechnology and Development Monitor* is a quarterly magazine, published in the Netherlands by The Network University in Amsterdam. It deals with topics in the biotechnology and development fields and is directed at developing countries and sustainable development. The primary audience of the *Monitor* consists of current and future policy makers, scientists, farmers, students, journalists and teachers whose profession and/or interest lies in sustainable development, agriculture and biotechnology.

Medical Anthropolgy Quarterly, International Journal for the Analysis of Health; Special issue on biotechnology and genetically modified foods. 2001. Vol. 15 /Number 1. pp.3-37. **FSRC #7994**.

The titles from this issue include:

Public Beliefs about GM Foods: More on the Makings of a Considered Sociology

Public Beliefs aboutGM Foods:Anne Murcott's Contribution

Toward a Public Economy of Opinion Formation on GeneticallyModified Foods

From Risk to Globalization: Discursive Shifts in the French Debate on GMOs

Health,Environment, and Transgenic Agriculture

Public Perceptions of Agricultural Biotechnology: A Nonsocial Science Perspective

Sociopolitical effects of new biotechnologies in developing countries. International Food Policy Research Institute, Lesinger, Klaus. 1995. 14p. **FSRC #1247**.

This paper examines the role that recombinant genetics and biotechnology can play in future food security. Only two roads now exist for increasing agricultural output--expansion of land undercultivation and intensification ofcultivation. As expansion possibilities dwindle, long-term increases in yields are the only viable answer. New seed varieties will play a key role in making high yields possible.

Genetically modified foods and developing country food security. Cohen, M., FAM Environmental Working Group (EWG), International Food Policy Research Institute (IFPRI). 2001. 4p. **FSRC #8091** .

This document is a copy of a presentation given at a Food Aid Management(FAM) Environmental Working Group meeting on GMOs. It points out the advantages and disadvantages of using geneticallymodified foods in developing countries for food security. View the Powerpoint Presentation online (768 KB) at: http://www.foodaidmanagement.org/powerpointdocs/environmentwg/Cohenbiotech.ppt

Geneticallymodified food;Implications for US food aid programs. ACDI/VOCA Food for Development Division. 2002. 21p. **FSRC #8100** .

This report explores implications of genetically modified crops on US food aid programs and the role private voluntary organizations play with respect to geneticallymodified organisms. Shortened version available at: http://www.foodaidmanagement.org/pdfdocs/foodforum/2001Q3/GMOs.pdf

Seeds of Contention; World Hunger and the Global Controversy overGM crops. Pinstrup-Andersen, P., Schioler, E. 2001. 164p. **FSRC #4468** .

In Seeds of Contention: World Hungerand the Global Controversy over GM Crops, developmentspecialists Per Pinstrup-Andersen and Ebbe Schiøler focus attention on the less discussed issues of the potential benefits and costs of geneticallymodified crops for developing countries. Pinstrup-Andersen and Schiøler review the basic issues and discuss the potential that such crops have for addressing the great needs of poor and undernourished peoples throughout the world. They explain how increased agricultural productivity is not enough in addressing the problem of famine. People in developing countries need crops that are disease-resistant, can fend off insect predators, and can withstand severe environmental conditions in order to produce larger crop yields. Pinstrup-Andersen and Schiølerare sober in their assessmentof these prospects, for they acknowledge that GM crops alone will not solve the world's food problem. They argue, however, that they may be one element in the solution and people in developing countries should have information about benefits and risks and the freedom to make their own decisions aboutwhether or not to grow and consume GM crops. For more information on-line see:

http://www.press.jhu.edu/press/books/titles/f01/f01pise.htm

Genesis. Smallhome, M. Nov, 1999. Skyways. 4p. **FSR C #775 6.**

This article addresses the introduction of geneticallymodified crops into South Africa, and raises the question of whether this is a phenomenon to be protested or welcomed.

Harvestof Fear. Frontline/NOVA, PBS. 1999. **FSR C #801 6**.

Are genetically modified foods a vital scientific breakthrough that will help to end world hungerand reduce global pollution, or are they "Frankenfoods" that will ruin health and provoke environmental disaster? NOVA and FRONTLINE present the first in-depth TV investigation of the perils and potential of this powerful new technology. 2-part series, approximately2 hours long video.

Governing the GM Crop Revolution; Policy Choices for Developing Countries. Paarlberg, Robert L.,IFPRI.2020 Vision FAE Discussion Paper. No. 33. 2000. 36p. **FSR C #590** .

The paper presents a system for classifying policy choices toward GM crops in the areas ofintellectual property rights, food safety, biosafety, trade, and public research investment. It also gives an up to date snapshot and analysis of policies toward GM crops for Brazil, China, India and Kenya. Paarlberg attempts to explain the differences and linkages between the policies of the 4 countries. Also available on-line in pdf format at: http://www.ifpri.cgiar.org/2020/seminars/011801.htm

Implications of GMOs for Title II (and other) developmentprograms, especiallyagriculture. Burpee, G.,Eriksen, P., in consultation w/ Cox, P. and Remmington, T. v.15(1),2002. **FSRC #15 95**.

The memo outlines two implications on CRS (Catholic Relief Services) development programs of the existence of GMO crops: the implication of corn and soybeans being found in US food aid and the implication for CRS farmer clients may face as researchers work on GMO crops that potentially make it easier for smallholder farmers to grow crops in marginal environments and that offernew nutritional benefits. The memo begins by asking some basic questions about the nature ofGMOs and the value of them in Food Aid. It briefly addresses the problems some people have with GMOs in Food Aid and looks at the US government's position as well as determining the problems that PVOs have faced because of the inconsistency and divides on the issue. The memo then goes on to assess the potential benefits and challenges ofGMO crops for smallholder farmers and theiragroecosystems. It looks lastly, at ways that the CRS country programs can reduce the burden of conflicts overGMOs in food aid.

Biotechnology in agriculture, forestry and fisheries – FAO's policy and strategy.

http://www.fao.org/ docrep/V4845E/V4845E02.htm

This document focuses on the development and application of modern biotechnology to agriculture, forestry and fisheries.

The socio-political impact of biotechnology in developing countries. Syngenta Foundation for Sustainable Agriculture. http://www.syngentafoundation.com/biotechnology_developing_countries.htm

This article discusses:

-building blocks for increasing food security in developing countries

-the role of biotechnology for food security in developing countries

-the preconditions for making the new biotechnologies socially compatible and

-an outlook: from knowledge to wisdom

World Summit on Sustainable Development(WSSD).

Agenda 21- Environmentally Sound Management of Biotechnology, Chapter 16.

http://www.un.org/esa/sustdev/agenda21chapter16.htm

This deals specifically with the environmentally sound management of biotechnology. The document notes the significant contribution ofbiotechnology in enabling the development of, for example, better health care, enhanced food security through sustainable agricultural practices, improved supplies of potable water, more efficientindustrial developmentprocesses transforming raw materials, support for sustainable methods of afforestation and reforestation,and detoxification of hazardous wastes. Agenda 21 also highlights the fact that biotechnology offers new opportunities for global partnerships between countries rich in biological resources and those who have the technological expertise to transform such resources so that they can serve the needs ofsustainable development.

Genetically modified crops: risks and promise. Conway G., Rockefeller Foundation.

Can agricultural biotechnology help to reduce hunger and increase food security in developing countries? Food and Agricultural Organization (FAO) 2000. http://www.fao.org /biotech/C5doc.htm

Making new technologies work for human development. UNDP 2001. http://www.undp.org/hdr2001/completenew.pdf

This report is abouthow people can create and use technology to improve theirlives. It is also about forging new public policies to lead the revolution in information and communications technology and biotechnology in the direction of human development.

Foods from GeneticallyImproved Crops in Africa.Africa Bio, San Diego Center for Molecular Agriculture.

http://www.agbioworld.org/biotech_info/topics/agbiotech/GMO-africa.pdf

Policies towards GM crops in India. Paarlberg R. 2001.

http://www.agbioworld.org/biotech_info/topics/agbiotech/policies.html

The Politics of Precaution: Genetically Modified Crops in Developing Countries. September2001. Paarlberg R.

Can GeneticallyEngineered Crops Feed a Hungry World? YES - We Must Tap Biotech's Potential. Prakash C.S. March 30, 2000. San Francisco Chronicle

http://www.agbioworld.org/biotech_info/topics/agbiotech/hungry_world.html

Why Africa Needs Agricultural Biotechnology. Wambugu F. Nature 400, July 1, 1999. http://www.agbioworld.org/biotech_info/topics/agbiotech/africa.html

Ushering the New Green Revolution: How Can Biotechnology Contribute to Food Security? Prakash C.S. 2001. http://www.agbioworld.org/biotech_info/topics/agbiotech/new_green.html

Biotechnology and India's food security - Unfounded fears forbid biotech research in India. Press release, 1 August2001. http://www.teriin.org/news/aug011.htm

Biotech and the poor. Andersen P.P. Washington Post, October 27, 1999.

http://www.agbioworld.org/biotech_info/topics/agbiotech/poor.html

Agricultural biotechnology : a review of contemporary issues. Ives, C.L., Johanson, A., Lewis, J., Mitchell Group, Inc., USAID. Bur. For Africa. Ofc. Of Sustainable Development. Jun, 2001. http://www.dec.org/pdf_docs/PNACN153.pdf

Modern biotechnology is an applied science, based on molecularbiology, that seeks to understand biological processes, such as drought tolerance in plants or human diseases like diabetes. Such knowledge can be used to engineer traits into crops, create diagnostic tools, or develop pharmaceuticals for human use. Biotechnology can be applied in a number of ways, most of which are not controversial, e.g., genetic engineering of crops, often called GMOs (geneticallymodified organisms),such as corn, potatoes and cotton. In the specific area of agricultural biotechnology, the United States is the leader in both research and commercial applications, but biotechnology research is also conducted by many European and Asian research institutions and industry, as well as in more advanced developing countries and by the international agricultural research centers (IARCs). The private sector dominates agricultural biotechnology, funding over 50% of the research and development in the United States. The strength of the private over the public sector introduces important policy issues -- particularly intellectual property rights (IPR) and biosafety (the effect of biotechnology on human health and the natural environment) -- that must be addressed when considering the needs of developing countries; discussion of these issues and of the international agreements concerning them constitutes the bulk of the present report. The concluding sections examine current USAID policies and programs USAID's socioeconomic benefits and the ethical concerns surrounding agricultural biotechnology

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'Learning to Grow' continued from page 2

Mushrooms and Other Good Things to Eat

Nutritional Considerations: If the primary objective of the school garden project is to supplement children's diet from a school lunch program, then you will need to consider carefully the types of vegetables you choose to cultivate to ensure a proper balance of nutrients. If you know that specific micronutrient deficiencies exist in the project area, you may want to concentrate production of a few specific crops. So, for example, if vitamin A deficiencies are prevalent, you will wantto plant green leafy vegetables such as kale, kohlrabi, spinach, chard, or other greens. Remember that protein-energy malnutrition may be challenging to address within the framework of a school gardens program unless you have extensive land area that can be dedicated to the production of crops high in protein and energy, such as soybeans, grains, and oilseeds. This is usually not the case due to land and labor constraints. However, I did visit a school livestock project in the **Dominican Republic** that was raising rabbits and pigs, fed with scraps of the school lunch program and fodder that children collected on their way to school. Some animals were consumed at school and others were sold to raise money. At most, a good school garden can be expected to supplement U.S. donated commodities in a Food for Education program. If well planned, these vegetables can contribute significantly to the daily requirement of micronutrients for the school's children.

Cultural Considerations: Introducing the consumption of vegetables into a culture that is not familiar with them through a school gardening program can be quite demanding. Those readers who are parents will acknowledge how difficultit is to get their own children to eat vegetables. However, careful and creative design of a school garden program that works closely with parents and teachers to create recipes that fit well into the local cuisine can be successful. This is an important step to support one favorite objective of many food security programs to improve diversity of diets, which is seen as a vital factor to improve the nutritional status of children. The logic is that if a child likes vegetables at school, s/he will begin to demand them at home. Of course, a parallel intervention must be occurring simultaneously with home gardens for this to work. Often times, local grown produce can make donated commodities more familiarand consequently more palatable. In **Haiti**, some schools spontaneously developed their own gardens in an attempt to balance out the donated peas and bulgur from USAID-sponsored school feeding program which school officials said the children found to be "boring."

Economic Considerations: If a project expects a school garden to generate revenue for some purpose, such as increasing teacher salaries, rehabilitating the school, buying materials, etc, then another level of analysis is required. Cost-benefit analysis utilized in business planning may be helpful in determining if a school garden is really the best way to raise money. Questions of how the garden will be managed, who will provide the labor, how will the produce be marketed, and how will the funds be accounted for and distributed are determinate for a successful commercial garden. While management issues are important for a garden program primarily designed for other purposes, they are critical for a garden designed for income purposes. Capacity for managing such a business venture must either be sought out in the community or be developed. In **Tajikistan**, a long-standing school-feeding program there utilized existing school committees to manage the gardens, marketing, and the resulting financial resources. In **Mexico**, federal schools in rural areas have had garden plots since Revolution times. Originally the school committee cultivated them collectively, but eventually it became easier to rent these lands out to community members with the rents going to help the school. Critically important to the success of school gardens for income purposes is the marketing of the produce. If there exists strong market integration and commercial traditions already, then it should be fairly simple to "add on" a school garden component. However, in areas where market development is incipient, such an activity should be approached carefully.

Educational Considerations: Students learn best by doing. Advocates of experiential education since Jean Piaget and Maria Montessori have recognized this and applied it to the classroom with tremendous success, while mass educators like Paulo Freire and Y.C. James Yen have turned the development process on its head by putting local people's intimate understanding first before that of the "expert" outsiders. The logic is simple and straightforward: "what I hear, I forget; what I see, I remember; what I do, I understand." Thomas Gladwin, in his book East is a Big Bird, clearly demonstrates that informal education relies heavily on action—repetitive action—and observation. Children learn a host of things from their parents in the context of dailylife. Much of what they learn is quite complicated and sophisticated. Traditional formal education situated in the classroom, and reliant upon chalkboards and rote memorization, can be a sub-optimal learning experience. New learning methodologies emphasize active participation and seek opportunities to learn outside the physical confines of the classroom. Much of the school garden experience in the United States seeks to use the garden growing experience in this manner—as part of the educational process for children. Children are engaged in the design of the garden, in choosing the right varieties of crops to plant, of estimating solar radiation and exposure, of measuring plant grow and production; in short, a whole series of applied curriculum activities that supplement classroom learning. If school feeding is involved, students can make food preparation an educational experience as well learning about chemistry, math, and physics.

This can be taken a step further and can involve community mobilization around the education process. In **Tucson, Arizona**, the school district became concerned about the "low-performance" of Hispanic students in the classroom. Building on the idea that different types of knowledge exist and that formal knowledge was only one such domain, the University of Arizona got the teachers out of the classroom and into the community to assess what learning resources might be available. The teachers did a human resource inventory of parents and found a wealth of knowledge and experience available. Parents and teachers then consulted with the students about a project they could do together. It was decided to take an abandoned lot belonging to the city government and make it into a garden park. Students learned a host of valuable things in the context of this applied curriculum and parents who were plumbers, carpenters, landscapers, and other types of professionals provided the technical assistance. Not only did the students learn, but also tremendous community solidarity around the school was created.

Integration and Sustainability Considerations: Integrating school garden activities with other food security interventions may ensure maximum impact. Nutritional education at school and parental education at home go hand in hand with dietary and agricultural diversification. School youth programs can develop around school gardens and reach out to out-of-school youths. Friendly growing competitions between schools that provide incentives and rewards to students can encourage youth to stay involved in farming and perhaps pursue a technical degree in agriculture. This is especially true in developing countries where there is a mass exodus from the countryside to the city.

Gardens as income generators need to be integrated with other access type activities to guarantee profitability. Inputs, such as high quality seeds, need be procured and seed saving can be promoted to reduce reliance on hard-to-find commercial varieties. School gardens and home gardens complement each other nicely and involving the parents with school gardens can reinforce the learning process of both the parent and the child. Gardens as a supplement to U.S. sponsored Food for Education programs make considerable sense, since school feeding is one of the best uses of donated commodities in a direct distribution program.

Which way do I go?

As you can see, direction all depends on where you want to go. Be clear about your objectives for a school garden program. Know what you want to achieve. Assess carefully the growing conditions in your schools. Check your human resources, both on staff and in the community. Selectively introduce plants that will contribute best to the child's nutrition and find ways to incorporate new foods in the local diet in culturally acceptable ways. Or, if your aim is to make money, choose crops that will do well in the market. Finally, making sure things get done, like watering, weeding, mulching and other important tasks, requires good management. This, in turn, requires individuals motivated and dedicated to seeing that the garden "works," that it meet its objectives. This key ingredient will ensure whether the garden grows or whether the fruits wither on the vine. I firmly believe that school gardens, if properly designed and managed, can provide nutritious and plentiful food for education for young children who precisely need it the most.

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